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## **Differences in Quality of Care by Insurance Plan: A Fee-For-Service vs. Health Maintenance Organization Comparison**

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To the Graduate Council:

I am submitting herewith a dissertation written by Pamela Driggers Silcox entitled "Differences in Quality of Care by Insurance Plan: A Fee-For-Service vs. Health Maintenance Organization Comparison." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Human Ecology.

James J. Neutens, Major Professor

We have read this dissertation and recommend its acceptance:

Paula Carney, Bill Wallace, Mary Ann Blank

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Mary Ann Blank

Acceptance for the Council:

Anne Mayhew  
Vice Provost and Dean of  
Graduate Studies

(Original signatures are on file with official student records.)

DIFFERENCES IN QUALITY OF CARE BY INSURANCE PLAN:  
A FEE-FOR-SERVICE VS. HEALTH MAINTENANCE  
ORGANIZATION COMPARISON

A Dissertation  
Presented for the  
Doctor of Philosophy  
Degree  
The University of Tennessee, Knoxville

Pamela Driggers Silcox

December 2002

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## ABSTRACT

The history of health insurance in the United States has perpetuated and enabled a health care industry that has been rewarded for increased spending rather than cost control. With the original plan setting no spending limit on health care providers, fee-for-service reimbursement provided greater incentive to spend than to contain costs. Attempts to control the soaring costs of health care services have given rise to managed care insurance plans that base reimbursement on health outcome data. Given that the birth of managed care includes stringent reimbursement guidelines and ensuing controversy over services provided or not provided, this study sought to determine if differences in quality of care existed between two common types of health insurance, fee-for-service (FFS) and health maintenance organization (HMO) insurance plans for the most costly chronic illness, congestive heart failure (CHF). Utilizing primary and secondary data obtained from an ongoing CHF study at the University of Tennessee Medical Center in Knoxville, Tennessee, this study compared CHF health outcomes between FFS and HMO insurance plans.

With an N of 154 cases, results revealed 0.37 of a day shorter length of stay in HMO members with an average of 4.95 and 5.32 days for HMO & FFS members respectively. In addition, HMO members displayed higher readmission rates with 25.6% of HMO members and 22.6% of FFS members readmitted to the hospital within 30 days of discharge with a related diagnosis. For the previously stated outcomes, no statistically significant difference was found between the insurance plans. Other findings included all six cases of mortality found in FFS insurance plans, however an exposed odds ratio test

did not indicate a statistically significant difference in mortality rates due to sample size and distribution. All six cases of mortality were found in patients ages 67 and up with an association between being age 67+ and enrolled in a FFS insurance plan.

Recommendations for future research include further study into length of stay and the possible effect on readmission rates for members of HMO insurance plans. Investigation into documentation of teaching, follow-up scheduled at discharge, and the effect on readmission rates could provide data supporting the need for adequate teaching and follow up to decrease exacerbations and subsequent higher readmission rates.

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## **CHAPTER I**

### **INTRODUCTION**

This chapter covers the following topics: introductory background, the need for the study, the statement of the problem, research questions, basic assumptions, delimitations, limitations, and definitions. This section provides a brief overview of the history of health insurance in the United States, including the emergence of managed care and the need for objective studies measuring the quality of care in managed care insurance plans.

### **NEED FOR THE STUDY**

The history of health insurance in the United States has perpetuated and enabled a health care industry that has been rewarded for increased spending rather than cost control. With the original plan setting no spending limit on health care providers, fee-for-service reimbursement provided greater incentive to spend than to contain costs. Attempts to control the soaring costs of health care services have given rise to managed care insurance plans that base reimbursement on health outcome data. Given that the birth of managed care includes stringent reimbursement guidelines and ensuing controversy over services provided or not provided, studies are needed to compare the quality of care provided by managed care insurance plans to the traditional method of health insurance, Fee-For-Service (FFS) cost reimbursement. In the sections below, the demise of the fee-for-service system and need for health care reform including managed care is discussed.

### *Evolution of Health Care Industry Reimbursement*

Although the rate of increase has slowed in the past few years, the cost of health care services in the United States (U.S.) adjusted in real dollars has continued to exceed the national rate of inflation for several decades (Getzen, 2000). Attempts to reform the current system have left legislators, committee members, and health care professionals exhausted and most unfortunately, back at the drawing table. In 1965, the introduction of Medicare and Medicaid provided the healthcare industry with greater financial resources from federal and state government funds. Unbeknownst to policy makers at the time, a fee-for-service sleeping giant was created that transformed the health care industry into a capitalistic, major money-making industry driven by dollars and cents. Decades later, as our nation ails in financial distress from the burden of attempting to finance health care services for its citizens, we have awakened to the realization that perhaps the initial plan did not include considerable foresight. In accordance with the old adage...if your outgo exceeds your income, then your upkeep will be your downfall...the United States government took drastic measures in the 1980s when they instituted Diagnosis-Related Groups (DRGs) to help control the escalating costs of the fee-for-service industry that had been created.

Given the undisputed point that the health care system needed to be reformed due to the United States Government spending far too great a portion of the Gross Domestic Product (GDP) on health care services through Medicare and Medicaid expenditures, the birth of managed care sought to manage costs and ease the burden of financing health care services for the U.S. government as well as commercial insurance providers. The advent of Health Maintenance Organizations (HMOs) brought about decreased health

care expenditures by managing costs, but also raised a very important question: has the quality of care decreased along with costs? Members enrolled in HMOs receive varying benefits compared to members enrolled in FFS (also known as traditional) insurance plans. The question has been raised that HMO members receive a different, possibly decreased quality of care compared to members of traditional FFS insurance plans. The foundation of managed care contract negotiations and the most reliable method to measure the quality of care is to evaluate patient (health) outcomes. Patient outcome measurements investigate the outcome of disease interventions and compare the benefit or lack of benefit of various therapeutic measures.

Treatments prescribed by physicians are often predetermined by insurance coverage, with some treatments being the bridge between life and death. Due to costs of expensive therapies insurance companies, and especially HMOs, provide certain therapies after greater scrutiny than has been provided for less expensive treatments. The Agency for Healthcare Research and Quality (formerly the Agency for Health Care Policy and Research) has led the way to Patient Outcome Research Teams (PORTs) whose purpose is to fund multidisciplinary teams of investigators to identify effective care for a variety of common medical and surgical health problems (Hickey et al, 1996). The goal is to disseminate the findings to the community to aid in the development of standards of care, the foundation of patient outcome measurement.

Tennessee has taken drastic measures to control escalating costs with the implementation of TennCare in January of 1994. In an attempt to contain excessive Medicaid expenditures, the state sought to introduce managed care to the Tennessee health care industry. With the growth of managed care in Tennessee, there is a need for

health outcome studies in the state of Tennessee comparing the quality of care between managed care plans and the previous traditional fee-for-service method of reimbursement.

### *Effects of Congestive Heart Failure on the Health Care Industry*

Whether on a local, regional, or national level congestive heart failure health outcomes are of concern to all health care providers given the seriousness and prevalence of this chronic, debilitating illness. The prevalence of CHF in the United States is approximately 4.7 million cases with an overall 5-year mortality rate of 50% (Whellan et al, 1999). The economic burden of the illness is monumental. Xuan et al (2000) conducted a retrospective study reviewing data from medical and pharmacy claims for CHF patients to examine the economic burden and treatment patterns for the illness in a managed care population. They report \$20.2 billion spent on CHF in the United States in 1998 alone and conclude that improved management of the condition is needed to reduce morbidity and associated treatment costs. Hospitalization has been concluded as the greatest source of economic burden. Given half of the patients discharged with a CHF diagnosis return to the hospital within 90 days, revealing the difficulty in managing the condition, the economic burden could be eased by instituting better case management of CHF patients (Xuan et al, 2000). Mackowiak (1998) recommended using a model to determine concentration of costs for a CHF population. By separating costs by the type of service or treatment utilized within a population, data specific to a population can be generated. In addition, information on the impact of various treatment strategies can be ascertained.

To validate the need for measurement of congestive heart failure health outcomes in East Tennessee, one only has to look at the prevalence and seriousness of the illness, as well the obvious deficiency in the literature. The leading cause of death in the state of Tennessee in 1997 was diseases of the heart, 308/100,000, with East Tennessee's prevalence rate higher than the state average, 312/100,000 (NAPHSIS, 1997). Given that the leading cause of death in the state of Tennessee was diseases of the heart and East Tennessee's prevalence is higher than the state average (NAPHSIS, 1997), more heart related studies leading to increased accountability of insurance plans to the quality of care they provide are needed.

Tennessee statewide health outcome studies were found comparing TennCare managed care plans by managed care organization as well as studies comparing managed care plans to fee-for-service insurance plans (discussed in detail in Chapter 2). Studies comparing health outcomes by insurance plan specific for congestive heart failure in the state of Tennessee could not be found. The need for health outcome studies comparing the quality of care for post-hospitalized congestive heart failure patients by insurance plan is evidenced by the deficiency of published studies in the literature review. There were no documented studies specific to measuring post-hospitalized congestive heart failure health outcomes by insurance plan in East Tennessee. Of the limited number of East Tennessee health outcome studies comparing outcomes by insurance plan, two were found that evaluated perinatal outcomes following the implementation of TennCare in 1994. Cooper et al (1999) compared perinatal outcomes among the managed care organizations providing care to TennCare enrollees. The appropriately designed study utilizing retrospective cohort analysis revealed varying mortality rates among the

managed care plans, but did not compare the rates to Tennessee's prior fee-for-service method of reimbursement. Utilizing the same design, Ray et al (1998) compared perinatal outcomes for TennCare enrollees to the previous Medicaid fee-for-service method of reimbursement. Their study revealed no changes in perinatal outcomes following the implementation of TennCare. In another appropriately designed retrospective study utilizing secondary survey data to calculate the effects of TennCare on utilization and outcomes, Sloan et al (2000) performed multivariate analysis to compare the care of patients hospitalized for acute myocardial infarction between TennCare and private insurance plans. Their study found no significant difference in the outcomes for TennCare and private insurance enrollees.

Nationally, studies supporting the need for further CHF outcome comparisons by insurance plan include Philbin et al (1998) who investigated the influence of payer status on the process of care and resource utilization among patients hospitalized for CHF in the New York State hospital system. Their retrospective study reported shorter length of stay and lower hospital charges for HMO patients, taking into account that fewer days hospitalized decreased total charges. In addition, they found Medicaid patients had longest length of stay, greatest hospital charges, and highest CHF readmission rate. Zannad et al (1999) further support the need for CHF studies given the prevalence of the illness and deficiency of recent epidemiological studies taking into account modern medical advances used in the treatment and management of patients with advanced CHF. An appropriately designed retrospective study conducted in Oregon by Hanyu et al (1998) utilized hospital discharge data to compare outcomes of care by insurance plan for elderly CHF patients discharged from the hospital in 1995. They reported no short-term

outcome differences among the varying insurance plans but suggested further attention be given to the increased use of emergency departments by managed care patients.

### **STATEMENT OF THE PROBLEM**

The problem addressed in this study determined differences in quality of care as evidenced by post-hospitalized congestive heart failure health outcomes between FFS and HMO insurance plans.

### **RESEARCH QUESTIONS**

In order to address the afore stated purpose of the study, the following research questions were developed:

- Research Question #1: How do comparable health outcomes differ for post-hospitalized congestive heart failure patients enrolled in FFS and HMO insurance plans?
- Research Question #2: How do health outcome measurements for post-hospitalized congestive heart failure patients enrolled in FFS and HMO insurance plans affect comparable morbidity rates?
- Research Question #3: How do health outcome measurements for post-hospitalized congestive heart failure patients enrolled in FFS and HMO insurance plans affect comparable mortality rates?

## **ASSUMPTIONS**

The following basic assumption regarding the investigation is as follows:

1. The secondary data provided was originally obtained using a valid and reliable instrument and appropriate methodology.

## **DELIMITATIONS**

For the purpose of this study the following delimitation was made:

1. This study was delimited to patients discharged from the University of Tennessee Medical Center, Knoxville, with a diagnosis of congestive heart failure enrolled in either a FFS or HMO insurance plan.

## **LIMITATIONS**

For the purpose of this study, the following limitation was made:

1. Due to the population being limited to post-hospitalized congestive heart failure patients in an East Tennessee health system, the generalizability of the findings will be limited to the patient population and geographical area from which the sample was selected.

## **DEFINITIONS**

For the purpose of this study the following definitions were developed:

**Centers for Medicare and Medicaid Services (CMS):** Formerly known as the Health Care Financing Administration (HCFA), the CMS is a federal agency within the U.S. Department of Health and Human Services that is responsible for running the

Medicare and Medicaid programs. In collaboration with the Health Resources and Services Administration, CMS is also responsible for the State Children's Health Insurance Program (SCHIP).

**Fee-for-service insurance plan:** A health insurance plan that reimburses providers a prearranged amount for specified treatments when billed for those treatments with little or no limitations on treatment set by the insurance provider.

**Health Care Financing Administration:** Now known as the Centers for Medicare and Medicaid Services (CMS). See CMS for definition.

**Health maintenance organization insurance plan:** A health insurance plan that provides and/or reimburses health care services based on predetermined outcome criteria and manages each enrollee's care based on that criterion. The focus of care is on prevention of disease.

**Managed care:** A method of financing and administration of health services based on supervision of health care with a focus on prevention of disease.

**Medicare:** A health insurance benefit provided by the United States government to qualified elderly and disabled citizens. The Medicare Part A benefit is managed by the Centers for Medicare and Medicaid Services and is funded by taxpayer dollars.

**Post-hospitalized congestive heart failure health outcomes:** Congestive heart failure is a cardiovascular disease condition secondary to the heart's inability to sufficiently pump the blood throughout the body; characterized by weakness, breathlessness, and edema usually found in the lower extremities secondary to venous stasis. The health outcomes measured for this study included the following:

1. Average length of stay (days)

2. Mortality
3. Gender (male/female)
4. Payor (FFS/HMO)
5. Readmitted within 30 days of discharge with related condition
6. Attending physician (cardiology, medicine, family practice, other)
7. Treated with ACE inhibitor
8. Follow-up with a health care provider within 2 weeks scheduled at discharge
9. Documentation of teaching (discharge instructions)
  - A. Diet
  - B. Weight
  - C. Medications
  - D. Activity level
  - E. CHF teaching booklet

**Quality of care:** Quality of care is the value and/or quality of medical care provided to patients by health care providers, hospitals, and other health related services, most often measured by health outcomes. For the purpose of this study, the quality of care is measured by the post-hospitalization congestive heart failure health outcomes described above.

## SUMMARY

In conclusion, the need for further studies comparing health outcome measures between FFS and HMO insurance plans is needed to maintain adequate quality of care. If left unquantified and unreported, quality of medical care will be determined fiscally by

pecuniary interested accountants and chief executive officers (CEOs) of large insurance companies rather than the health care providers. The goal of this study is to provide health outcome results by insurance plan, thereby increasing accountability of those plans to its enrollees.

### **ORGANIZATION OF THE STUDY**

The following sections will include the literature review, methodology, results of the study, and conclusions.

## CHAPTER II

### REVIEW OF LITERATURE

#### INTRODUCTION

The purpose of this chapter was to review research and literature findings related to measurement of health outcome variations based on insurance status, specifically those comparing FFS and HMO insurance plans, in addition to those studies utilizing secondary data to further analyze health outcomes. The studies reviewed reported primarily on secondary health outcome data obtained from large databases, from secondary hospital data, or data obtained by managed care organizations for fee schedule and length of stay research. Evidence based medicine (EBM) was incorporated into the literature review process to provide a framework for establishing validity. A brief section below defines the role of EBM in this study with subsequent sections reporting the literature findings based on content, methodology, and content and methodology combined.

#### *Evidence Based Medicine and Review of Observational Studies*

First developed in the 1980s at McMaster Medical School in Canada, the goal of evidence based medicine seeks to improve the quality of clinical decisions by furnishing health care providers with a framework to review and integrate published research into their assessment and treatment of patient conditions (Sullivan, 2000). The term has since been broadened to evidence based health care (EBHC) given its increasing scope of practice. Large databases and health care providers ill-equipped to review enormous volumes of information contributed to the need for EBM. To fully apply the principles of

EBM, evidence based practitioners must have an understanding of the patient's circumstances or predicament, to identify knowledge gaps and frame questions to fill those gaps, to conduct an efficient literature search, to critically appraise the research evidence, and to apply that evidence to patient care (Guyatt et al, 2000).

Randomized controlled studies provide the highest level of evidence, however the use of observational studies is commonly required when comparing outcomes among health care providers or institutions (Naylor & Guyatt, 1996). EBM provides guidelines to determine validity when reviewing observational studies. The authors address the importance of reporting on the quality and comprehensiveness of the secondary data source. Of greatest importance is for patients to be similar in all ways except for the outcome being measured, with the application of multivariate analysis to adjust for differences (Naylor & Guyatt, 1996). In determining whether or not the data has been adjusted for differences among patients, Naylor and Guyatt propose three core questions in Table 2.1.

In addition to the above questions, the authors determine factors that may affect outcomes by asking who, what, when, and where the service was provided. These key questions were applied to the published research reviewed later in this chapter. The sections below contain a review of the literature with application of EBM principles.

## **RESEARCH AND LITERATURE RELATED IN CONTENT**

The purpose of this section was to review research and literature related in content. The sections below discuss the methodology of health outcome measurement, cost issues associated with those measurements, congestive heart failure (CHF) health outcomes

---

**Table 2.1: Evidenced Based Medicine:  
Three Core Questions**

---

1. Are the outcome measures accurate and comprehensive?
- 
2. Were there clearly identified, sensible comparison groups?
- 
3. Were the comparison groups similar with respect to important determinants of outcome, other than the one of interest?
- 

*Source: Naylor & Guyatt, 1996*

---

specifically, and the economic burden of CHF on the health care industry including methods to decrease costs.

### *Methodology of Health Outcome Measurement*

Health outcome research findings guide the health care industry in the ultimate goal of providing cost-effective, high quality of care. Schlenker (1996) proposed five convincing reasons to analyze outcomes of care: (a) payers are demanding information about the results of care delivery; (b) outcomes are an integral part of accreditation; (c) consumers have a right to know about outcomes; (d) regulatory agencies demand information about outcomes; and (e) outcomes represent the basic reason for providing care. Well-designed methodologies of outcome measurement evaluation are essential due to the magnitude of the decisions made based on outcome findings. Dobrzykowski (1997) recommends that a comprehensive outcomes management system include patient-reported measures of

health status and satisfaction, clinical measures of function and efficiency, and population descriptive information including age, diagnoses, and comorbidity, in addition to providing careful consideration for data collection protocol, training procedures, data processing, and statistical analyses (Dobrzykowski, 1997).

A division of the Department of Health and Human Services, the Agency for Health Care Research and Quality (formerly known as the Agency for Health Care Policy and Research) is conducting numerous outcome measurement studies across the nation. According to the AHRQ, outcome research has become the key to developing better ways to monitor and improve the quality of care (AHRQ, 1999). The AHRQ seeks to provide safe and effective outcome measurement data to develop guidelines for physicians to follow, regardless of usual practices. The results of the agency's research are aiding in the development of "report cards" that purchasers and consumers can use to assess the quality of care in health plans.

Using an observational design, Jennings et al (1999) provided a valuable framework for classifying outcome indicators by reviewing outcomes literature published since 1974 from medicine, nursing and health services outcome indicator research. By keyword searching Medline, the Computerized Needs Oriented Quality Measurement Evaluation System (CONQUEST), and the Healthcare Cost and Utilization Project (HCUP), the authors compiled a list of indicators based on frequency of citation, differences in the spectrum of philosophical perspectives, and empirical work examining actual outcomes (Jennings et al, 1999). The authors recognized that the study was not comprehensive due to the vast amount of published outcomes research since 1974 but did not state the actual method of selecting the articles reviewed for the study. From their review they found a

pattern that focused on three categories of outcomes research: patient-focused, provider-focused, and organization-focused. Although not identified in the review, they propose a fourth category, population-focused outcomes, be added to the categories to provide greater comprehensiveness. Table 2.2 further defines their findings and provides an excellent tool for classifying outcome indicators. The authors conclude that the integration of numerous outcome indicators from a variety of categories contributes to a more balanced view of health care delivery as compared with focusing on a few common indicators or only one category (Jennings et al, 1999).

#### *Cost Issues Associated with Health Outcome Measurement*

Cost issues associated with the results of health outcome measurements have produced scrutiny among the patients, health care providers, and health insurance companies regarding the objective to receive, provide, and reimburse cost-effective, high quality of care. Health outcomes were found to be of great interest to managed care organizations with multiple studies funded by HMOs. Managed care organizations (MCOs) use outcome measurements to determine resource allocation and payment for various illnesses.

Contracts between health care providers (HCPs) and HMOs are often based on outcome measures. Given that HMOs focus on outcome measures to control their expenditures for treatments, it has been discovered in this literature review that a deficiency exists in research comparing health outcomes between FFS and HMO insurance plans. Sullivan (1999) contends that although the need for more managed care plan (MCP) and FFS plan comparison studies is obvious, the number of reliable studies has been minimal.

**Table 2.2: Outcome Indicators According to Category**

Subsets	Definition	Unit of Measure	Unit of Analysis	General Examples	Sample Indicators
Category: Patient-focused					
Diagnosis-Focused	Measures related to a disease state or physical condition; measured at a discreet level providing information about changes in a patient's condition.	Patient	Patient or sub-elements within a patient	Quantitative indices (lab values, results of tests of physiological function), other biomarkers, clinical signs and symptoms	CBC PO2 Apgar scores Vital signs Dyspnea Weight gain
Holistically-Focused	Measures related to a person's responses or adaptation to an alteration in health; measured at a global level to provide objective and subjective information about domains	Patient	Patient	Overall measures of health status or health-related quality of life; self-reports of knowledge or satisfaction; performance on objective tests	Behavioral parameters  Comfort/discomfort  Functional status/physical function  Psychological function  Social function  Activities of daily living  Mobility  Disability  Health status/health-related quality of life  Patient knowledge  Patient satisfaction  Symptom management
Category: Provider-focused					
Professional Provider	Measures of provider proficiency and use of services	Patient	Provider	Complication rates; interventions such as appropriate use of medications; provider profiling	Appropriateness of treatment  Sentinel events  Technical proficiency
Family Caregiver	Measure of demands on family members and significant others providing patient care	Caregiver	Caregiver	Measures of family or caregiver burden	Caregiver burden/strain  Caregiver interaction
Category: Organization-focused					
	Measures aggregated across patients to provide evidence of an organization's effectiveness	Patient	Organization	Measures across organization's rates of untoward events, e.g. deaths, falls, readmissions	Access to care  Cost  Length of stay  Morbidity

**Table 2.2: Outcome Indicators According to Category Continued**

Mortality
Other rate-based outcomes e.g., Caesarean sections, infections, falls, medication errors, unplanned return to surgery

*Source:* Based on Jennings, B.M., Staggers, N. & Brosch, L. (1999). A classification scheme for outcome indicators.

*Image:* *Journal of Nursing Scholarship*, 31(4), 381-388.

He reports that only 2 comprehensive reviews of the literature published in peer-reviewed journals have been performed since 1980, both by Miller and Luft (1994 and 1997).

Miller and Luft examined studies reporting on the differences in quality of care, cost, and utilization rates between MCP and FFS plans and concluded that the quality of MCP care was roughly the same as FFS care (Sullivan, 1999). Sullivan further reviewed their findings for quality of care by controlling for breadth of insurance coverage, stating the need to limit MCP and FFS plan comparisons to those studies in which coverage and benefits in each setting are comparable due to differences in care seeking behavior based on services covered. He found MCP care to be equal or inferior to the care provided by FFS plans. Miller and Luft responded to Sullivan's review of their findings and purport that by controlling for the above, the number of studies with results favorable to HMOs is substantially reduced and the overall number of studies eligible for reanalysis would be reduced to an insignificant amount. They state that adopting Sullivan's logic would be a disservice to policy makers, consumers, and purchasers who need to better understand potential consequences of differences in bundles of plan characteristics. In addition, they state that improved measurement and reporting of both FFS and HMO plan performance

would allow regulators to evaluate plans, and consumers and purchasers choose among plans, on the basis of their comparative performance results (Miller, 2000).

In 1997, Margo Zink wrote of the ethical implications related to changes in the health care industry brought about by managed care. Many divisions of health care services have experienced increased financial burden due to reimbursement limitations set forth by managed care organizations. Zink states that although ethical challenges are present, managed care organizations experience greater responsibility and accountability due to their focus on cost-effectiveness. MCOs maintain or attempt to maintain integrity by basing reimbursement and approved procedures on health outcome measurements that were previously determined. Douglas Olsen (1995) also wrote of the MCO ethical implications in *Ethical Cautions in the Use of Outcomes for Resource Allocation in the Managed Care Environment of Mental Health*. In addition to Zirk, Olsen postulated ethical cautions for MCOs when basing reimbursement for mental health services on outcome measurements. The author states there is difficulty in defining good outcomes and recommends review based on process measurements instead of loosely defined health outcomes.

Jones et al (1997) reported on the lack of nurse involvement in outcome measurement initiatives in *Policy Issues Associated with Analyzing Outcomes of Care*. The authors state that an endeavor on the local, national, and international levels has been undertaken to provide adequate outcome measurement data and has neglected to include nurses as valid resources in the research and development of such data. They go on to state that nurses must get involved in the process and include their expertise in the development of outcomes of care.

In 1993, Alexis Wilson wrote of the need for patient outcomes in Bridging Cost and Quality through Patient Outcome Measurement. According to the article, our health care financing and delivery system contains more incentives to spend than to not spend (Enthoven, 1991). In addition, our country is determined to receive top-notch technological care, and if not received, litigation ensues. Due to high expectations, costs soar. She concludes by stating that effective outcome measurements need to be instituted at every level, and that they will become the tools used to evaluate and purchase health care based on quality.

#### *Congestive Heart Failure Outcome Measurement*

Studies related to CHF health outcomes were also reviewed given the subject of this study. A chronic debilitating illness, CHF afflicts an estimated 4.7 million Americans with a 5-year mortality rate of 50% (Whellan et al, 1999). In a collaborative effort between the American College of Cardiology, American Heart Association, and the Agency for Health Care Policy and Research, a series of guidelines outlining interventions for CHF were developed. Table 2.3 further defines those interventions. Whellan et al (1999) suggest the guidelines need to add more recent clinical advances such as initiation and titration of beta blockers, titration of ACE inhibitor to high target dose, addition of spironolactone in patients with NYHA class III or IV, and maintenance of digoxin concentration at lower end of therapeutic range (0.6 - 1.0ng/ml). They conclude by recommending the best approach to CHF treatment include close follow up and a multidisciplinary team comprised of a primary care physician, a cardiologist specializing in heart failure, and other health care providers including nurses, pharmacists, physical therapists, dieticians, and social workers.

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**Table 2.3: CHF Treatment Recommendations**


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- Asymptomatic patients with ejection fractions <35-40% should be treated with an ACE inhibitor.
- All patients with symptoms suggestive of heart failure should undergo an evaluation including measurement of left ventricular function unless other disease is clearly evident.
- Presence or suspicion of heart failure and/or any of the following findings usually indicates a need for hospitalization: evidence of acute myocardial infarction, respiratory distress, pulmonary edema, severe complicating medical illness, anasarca, symptomatic hypotension, heart failure refractory to outpatient management.
- Diuretics should be used for patients with heart failure and/or signs of significant volume overload.
- After a diagnosis of heart failure is established, all patients should receive counseling on the disease, the prognosis, the symptoms to watch for, and the different therapies available.
- All patients with heart failure should be given a trial of ACE inhibitors unless specific contraindications exist.
- Patients with ischemic cardiomyopathy should be advised of the possibility of revascularization unless they have a specific contraindication.

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*Source: AHCPR/Whellan et al, 1999*

Smith & Konstam (1999) further support prevalence and cost by stating that CHF remains the most common Medicare discharge diagnosis with overall direct costs in excess of \$10 billion in 1990, more than two thirds of the monies spent on hospital care.

Croft et al (1999) identified a national cohort of Medicare patients utilizing secondary data obtained from Medicare hospital claims records (1984-1986) and Medicare enrollment records (1986-1992) to observe 6-year heart failure survival in patients older than 67 years of age. Probability of patient survival after their first hospitalization for heart failure was determined utilizing Cox proportional hazards regression for groups

defined by race, sex, age, Medicaid eligibility, and comorbid conditions. Utilized when there are time-dependent censored observations, the Cox regression technique allows the independent variables in the regression equation to vary with time, the dependent variable being survival time of the patient (Dawson-Saunders & Trapp, 1994). The authors recognize that the sample size of 170,239 patients 67 years or older admitted and discharged with a primary diagnosis of heart failure in 1986 (total CHF claims submitted in 1986 was 1.2 million) may negate the generalizability of their findings to the national population, in addition to the fact that the study participants included only noninstitutionalized subjects who were healthy enough to participate. Their study revealed one third of the patients died within the first year and only 19% of black men, 16% of white men, 25% of black women, and 23% of white women survived 6 years (Croft et al, 1999). In addition, an increase in mortality was associated with Medicaid eligibility (white adults only) and diabetes. Their study further supports the needs for prevention and proper disease management of this chronic debilitating illness.

In a well-designed single center prospective randomized trial study, Rich et al (1995) assessed the effects of multidisciplinary interventions on rate of readmission, quality of life, and the overall cost of medical care for high risk, hospitalized CHF patients 70 years or older. Study participants were randomized with the use of a treatment and control group. Results revealed 90 day survival rates without readmission to be 75 patients in the control group (53.6%) compared to 91 patients in the treatment group (64.1%) with no significant difference noted. However, a significant difference was determined when analysis was limited to survivors of the initial hospitalization (54.3% in control group and 66.9% in the treatment group,  $p=0.04$ ). The authors concluded that a multidisciplinary

treatment strategy could reduce hospital readmissions for elderly CHF patients (Rich et al, 1995).

### *Economic Burden of CHF on the Health Care Industry*

As discussed earlier in the chapter, the economic burden of CHF on the health care industry is overwhelming. The section below provides further analysis of those studies examining the economic burden of CHF.

Xuan et al (2000) performed a retrospective review of medical and pharmacy claims to examine the costs and treatment patterns for CHF patients in a managed care population. Patients with a diagnosis of CHF and claims eligibility of at least one year were selected from 6 independent-practice-association HMO enrollee lists for the calendar year 1994. They examined charges incurred by CHF patients for the 6 months following the initial CHF medical claim and the treatment received by those patients. The study revealed 378 of the 2777 CHF patients (14%) were admitted to the hospital with a cost of almost \$3 million. In addition, 78% of the population received prescription drugs, an average cost of \$942 per patient (Xuan et al, 2000). ACE inhibitors were the most commonly prescribed drug. Fifty-four percent of the total CHF treatment costs went to hospitalization, and prescription drugs accounted for 38% of costs. The authors conclude that decreasing hospital admissions/readmissions could markedly reduce the economic burden of CHF on the managed care population and suggest further research to conclude whether or not increased use of prescription drugs could contribute to decreased hospitalization rates and overall costs (Xuan et al, 2000).

Rauh et al (2000) performed a non-randomized controlled trial to observe the effects of a multidisciplinary treatment approach on length of stay, admission and readmission

rates, and costs to both patient and provider. Participants were selected based on presence of a CHF diagnosis with 407 patients in control group and 347 in treatment group. Via telephone interviews during the 90 days following discharge, the treatment group received intensive patient and family education on diet, compliance, and symptom recognition, in addition to outpatient infusion of inotropic agents and aggressive pharmacologic treatment for patients with advanced CHF (Rauh et al, 2000). The authors did not provide information on refusals, exclusion of patients, or whether patients were lost to follow up. Their results revealed the mean length of stay for the treatment group was 1.6 days less than the control group (statistically significant at .05 risk level) with decreased costs associated with decreased length of stay. The authors conclude that a multidisciplinary CHF program can improve patient care in the hospital setting while significantly reducing costs to both patients and institutions (Rauh et al, 2000).

In conclusion, the overwhelming majority of studies support the need for more efforts aimed at prevention and control of exacerbation of CHF to improve outcome measurements and decrease overall costs. In addition, further studies revealing CHF health outcome variations between FFS and HMO insurance plans are needed to determine whether a particular plan provides greater or lesser care in the presence of controlled expenditures.

## **RESEARCH AND LITERATURE RELATED IN METHODOLOGY**

The purpose of this section was to review research and literature related in methodology. The previous section explored the various elements of health outcome measurement and CHF treatment costs, whereas the methodology section explores the

value of secondary data in well-designed research both related and unrelated to health outcome measurement.

The methods applicable to collecting health outcome data include primary data obtained from surveys or instruments prepared by the researcher. More easily procured, secondary data obtained from hospital, federal, or other administrative databases provides an excellent source of valid research data. The assessment tool currently under study and being considered for dissertation use involves an instrument developed by a board of cardiologists and other cardiac practitioners at the University of Tennessee Medical Center, Knoxville (UTMCK) that measures various CHF outcomes on selected patients at time of discharge. The instrument was developed, in part, due to a nationwide study that CMS is conducting utilizing a federal Quality Management Review form that participating hospitals complete upon discharge. The form was created by CMS who is analyzing the data for specified quality of care indicators. The UTMCK is participating in CMS's study on measuring health outcomes related to one of the six possible areas of participation, CHF. UTMCK developed a comprehensive instrument that collected more extensive CHF data than the form provided by CMS. CMS's form clearly delineates and measures the quality of care administered to the patient in the hospital and upon discharge, based on pre-defined criteria that has been deemed safe and effective treatment for CHF patients. The form does not allow for patient satisfaction parameters in defining quality of care, rather bases the quality on medical treatment. In addition to the quality of care provided the type of insurance is also documented, thus enabling the researcher to obtain health outcome data and compare it by insurance plan. No studies using this form

have been found in the literature review. Further explanation of the UTMCK instrument from which this study collected secondary data is discussed in chapter three.

Hanchak & Kelly (1997) described the benefits of secondary data analysis to evaluate health outcomes in *Using Administrative Data to Evaluate the Quality of Care*. The advent and advancement of medical informatics has opened a technological frontier for data collection and evaluation. The authors describe how U.S. Quality Algorithms, Inc. (USQA) uses administrative data to measure and improve the quality of medical care in the United States. The Health Profile Database, which can be accessed to collect and measure quality of medical care, includes information regarding services provided by primary care physicians, specialists, and hospitals that are paid through capitation or fee-for-service reimbursement models. In addition, information regarding pharmacy usage, laboratory and test results, patient satisfaction, and health status information can be retrieved as well. The Health Profile Database focuses on chronic medical conditions, utilizing ICD-9, CPT-4, pharmacy codes, laboratory test results, and patient demographic information to classify patients within the database. The authors conclude by stating that costly treatments invoked by chronic diseases can be managed more effectively by defining the conditions that will benefit from further medical treatment. The following studies utilize secondary data in their methodology.

In *Correlates of Health Status among Black and White Elderly*, Yu et al (1998) performed a study utilizing secondary data from the National Health Interview Survey (NHIS) to examine the health status of non-institutionalized elderly in the United States. The NHIS is a health interview survey distributed annually by the National Center for Health Statistics. The current study collected information regarding health and other

characteristics of each household member. The computer program SUDAAN was used to analyze the findings, which allows incorporation of the complex sampling design of the NHIS into the variance estimation and the odds ratios (Yu et al, 1998). The respondents were grouped into young-old (65-79) and old (80 years and older) groups. The elderly were asked by the NHIS to respond to self assessed health status questions with possible responses including excellent, very good, good, fair or poor. Black and white populations were analyzed separately with other racial groups excluded from the study. Logistic regression was used to examine correlates of health status. Excellent and very good responses were grouped together as excellent health and good health was deemed the reference category. Comparisons were made between excellent vs. good health and poor vs. good health. Results revealed 30% of elderly reported excellent or very good health and 14% reported poor health. Of the young-old and old categories, Whites reported better health than Blacks in both categories. Of the White young-old who reported excellent health, they tended to be single, never married, better educated, and/or with higher income, fewer activity limitations, fewer chronic illnesses, and fewer physician visits in the last 12 months than the White old or either Black groups. Higher educational levels reflected higher health reporting. Further analysis regarding self assessment of health status by ethnic group is needed to explain whether or not variation in self reporting is due to actual or perceived illness or disability.

Utilizing both primary and secondary data obtained from a federal database, Carroll et al (1999) explored parental concern over teens contracting AIDS. Utilizing the Health Belief Model and a family systems perspective as a framework, they first collected secondary data from the National Commission on Children: 1990 Survey of Parents and

Children, and then collected primary data from telephone interviews. The purpose of the study was to determine what factors predicted an adolescent's worry about contracting AIDS and to what extent parents agreed with their children. Participants for this study were selected based on those who responded yes to "worry about AIDS" in the national study, and were further sub-sampled utilizing a random sample from telephone numbers as well as supplemental random samples of African American and Hispanic children. The data was collected over the telephone with interviews lasting approximately 30 minutes. Children ages 14 to 17 years of age were asked, "How much do you worry that you will get AIDS someday" and parents were asked, "How much do you worry that he/she will get AIDS?" Responses with missing data or "don't know" responses were excluded from the study. Data analysis was performed using Pearson's chi-square to compare the teen's worry score with influencing factors. Cramer's Vor Kendall's Tau was used to test the strength of the relationships (Carroll et al, 1999). Results revealed 46% of the parent/teen pairs agreed in their responses about worry over contracting AIDS.

In summary of other studies utilizing nonfederal databases to collect secondary data, several studies were performed to measure the impact of managed care on health care utilization and patient outcomes following emergency department visits. The method included collection of secondary data from the patient's medical record. O'Neil et al (1994), found that HMO enrollees were less likely to be hospitalized, less likely to utilize emergency department services, and have fewer visits to a primary provider in the 4 month follow-up period. The researchers controlled for health status at baseline and found no differences at the end of the 4-month period. Pearson (1994) reported on the findings of a study performed to measure the impact of membership in an HMO on

hospital admission rates for patients presenting to the emergency department with acute chest pain. Analysis of insurance status along with patient outcome data was performed after grouping patients in low, medium, and high-risk cohorts. The patient's medical record was used to collect the secondary data. The researchers found that hospital admission rates were similar for all high-risk patients, regardless of payment source. Surprisingly, HMO admission rates for low and medium risk patients was higher than for commercial insurance or other payment source. The findings are contrary to previous studies, which report decreased hospitalization in HMO enrollees.

Concluding the methodology review, it is apparent that federal databases and medical records are an excellent source of secondary data. Select federal databases are accessible through the Internet at the Center for Disease Control and Prevention's web site ([www.cdc.gov](http://www.cdc.gov)). In addition to the above, the CDC publishes reports through the National Center for Health Statistics, providing even greater access to volumes of national data. Given the accessibility of information available through federal databases, they provide an excellent source for studies concentrating on secondary data analysis.

## **RESEARCH AND LITERATURE RELATED IN CONTENT AND METHODOLOGY**

The purpose of this section was to review research and literature related in content and methodology. This section reviews general studies utilizing secondary data to compare health outcomes by insurance type, including studies related specifically to CHF. Studies utilizing secondary data to compare health outcomes by insurance type are reviewed below.

*Studies Utilizing Secondary Data to Compare Health Outcomes by Insurance Type*

Utilizing CMS cost reports, Cher & Lenert (1997) reported on the possibility of potentially ineffective care (PIC) provided to Medicare patients enrolled in HMOs and traditional fee-for-service health plans based on outcome data for patients in critical care units. The method included analysis of secondary data obtained from a Medicare administrative database for the state of California. The database used, The Medicare Provider Analysis and Review (MEDPAR), contained information on age, sex, race, total hospital charges, length of hospital stay, ICU care indicators, International Classification of Diseases (9th Revision), Clinical Modification diagnosis and procedure codes, length of time from hospital admission to death during approximately 1 year of follow-up, and CMS indicators for reimbursement method (HMO vs. other). In addition to the MEDPAR database, CMS's cost report minimum data set for each hospital was included. The data includes indicators such as type of hospital (rural vs. non-rural, teaching vs. non-teaching), hospital and ICU size, total hospital operating costs and charges, number of full-time residency positions, bed availability, and bed use (Cher & Lenert, 1997). In addition to the above, 1994 wages for the metropolitan statistical areas of California obtained from CMS's website was included in the data. All patients who received critical care services in the state of California in the fiscal year 1994 were included in the study. The relationship between risk of a PIC outcome and HMO membership was determined after adjusting for severity of illness and differences in organizational features of the treating institution (Cher & Lenert, 1997). They found that PIC was less common among HMO enrollees, however HMO enrollees were less likely to die in the hospital (possibly indicating a decreased hospitalization rate for HMO enrollees). If HMO enrollee

hospitalization rates are lower, PIC results may be skewed due to lack of data on those enrollees who die outside of the hospital. The authors concluded that HMO plans may avoid misuse of critical care resources near the end of life compared to FFS plans.

Other related studies included Riley et al (1999) who reported their findings in the *Journal of the American Medical Association*, Stage at Diagnosis and Treatment Patterns among Older Women with Breast Cancer: An HMO and Fee-For-Service Comparison.

Utilizing cancer registry data from the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program (data linked to Medicare enrollment records), the researchers investigated the treatment patterns for elderly women with breast cancer based on stage at diagnosis and type of insurance. HMO and fee-for-service (FFS) insurance plans were compared. The SEER database includes information on month and year of diagnosis, cancer site, patient demographics, extent of disease at diagnosis, and therapy administered within 4 months of diagnosis (Riley et al, 1999).

Women 65 or older who were entitled to Medicare part A and B benefits with breast cancer between 1988 and 1993 were included in the study. Medicare enrollment records disclosed information regarding enrollment in either HMO or FFS setting. Cases with bilateral disease, those with no mass found, those who switched from HMO to FFS or vice versa within 4 months of diagnosis, and cases not treated by either breast conserving surgery or total/modified radical mastectomy were excluded from the study. Information regarding stage at diagnosis and treatment patterns was gleaned from the SEER database and then compared based on HMO or FFS enrollment. Results revealed HMO enrollees were less likely to have breast cancer diagnosed at late stages than FFS patients. In addition, women diagnosed with early stage breast cancer received similar rates of breast

cancer surgery regardless of payment source. For those undergoing surgery, HMO enrollees were more likely to receive radiation therapy. In conclusion, the authors state that the differences reported were often inconsistent and that HMO enrollees did not appear to have access problems (HMO agreeing to pay for the treatment) obtaining radiation therapy after breast cancer surgery than women in FFS settings.

Laurance Baker (1999) studied the variations in treatment levels for fee-for-service Medicare patients based on the prevalence of managed care in geographically defined areas. In *Association of Managed Care Market Share and Health Expenditures for Fee-For-Service Medicare Patients*, Baker used secondary data from a CMS database to compare expenditures for the care of Medicare fee-for-service beneficiaries in areas with and without a high HMO market share. The method included comparing Medicare market share between predominantly HMO and FFS areas. The main independent variable was the system-wide HMO market share in each market area (Baker, 1999). Due to the possible nonlinear relationship between HMO market share and expenditures (presence of a greater number of healthier members transferred to HMO plans with sicker, more costly patients left in FFS plans) the expenditures would rise per capita in FFS plans as the HMO enrollment increased, therefore inclusion of both system wide HMO market share and its square was performed. The findings reported that in all areas defined, an increase in HMO market share reflected a decline in Medicare fee-for-service expenditures. A direct association between high levels of managed care and decreased fee-for-service Medicare expenditures was determined. The above study further supports the applicability of secondary data previously obtained by the Centers for Medicare and Medicaid Services to studies relevant to the data on hand.

Himmelstein et al (1999) compared 14 quality of care measures for investor-owned and not-for-profit HMOs. Using data obtained from the National Committee for Quality Assurance's Quality Compass 1997, including the Health Plan Employer Data and Information Set (HEDIS) and HMO accreditation surveys, the researchers found that investor-owned plans scored lower on all 14 quality of care indicators that were assessed. After controlling for model type, geographic region, and the method each HMO used to collect data, the researchers determined investor-owned plans consistently scored lower in all areas reviewed. The group concluded that based on their research findings, investor-owned HMOs deliver a lower quality of care than not-for profit HMOs.

Sidorov et al (1997) conducted a descriptive study to measure the success of a tobacco cessation program that compared quit rates among managed care enrollees and (not stated) non-managed care plans. They found that non-HMO enrollees were less likely than HMO enrollees to achieve success. They concluded by stating that tobacco cessation programs were more likely to benefit HMO enrollees, although the benefit to non-HMO members was significant. The funding source for the study could not be determined.

Yelin, Criswell, & Feigenbaum (1996) reported health outcome differences among rheumatoid arthritis (RA) patients in prepaid group practice/HMO (PGP) and fee-for-service (FFS) settings in Health Care Utilization and Outcomes Among Persons with Rheumatoid Arthritis in Fee-For-Service and Prepaid Group Practice Settings. Utilizing annual telephone interviews for follow-up on an 11-year study, the authors concluded that despite literature findings prior to onset of the study, they found no difference in the quality or quantity of care provided to RA patients in either the PGP or FFS setting.

Given their findings, the authors conclude that method of reimbursement, specifically PGP or FFS, does not affect the quality of health care received.

#### *CHF Studies Comparing Outcomes by Insurance Type*

A significant deficiency in literature existed at the time of this literature review that compared CHF health outcomes between FFS and HMO insurance plans. The following studies utilized secondary data to compare CHF outcomes by insurance type.

Hanyu et al (1998) examined CHF outcomes by insurance type in Managed Care and Outcomes of Hospitalization among Elderly Patients with Congestive Heart Failure. With the objective of examining the effects of HMO enrollment on the outcomes of hospitalization, the authors conducted a retrospective cohort study that reviewed the Oregon hospital discharge data set for patients 65 years or older with a diagnosis of CHF in the year 1995. CHF patients were divided into 6 insurance groups that included managed care, Medicare, Medicaid, commercial or private insurance, self-pay, and other (not defined). Data reviewed from the hospital discharge data set included admission to hospital via emergency department, length of hospital stay, in-hospital mortality rate, and readmission rate. The study found that managed care patients were more likely to be admitted to the hospital via the emergency department. After adjusting for age, sex, and comorbidity, managed care length of stay was similar to that of commercial or private insurance patients, but experienced a shorter length of stay compared to Medicare, self-pay, and other patients. No comment was made on differences between managed care and Medicaid patients. No difference in the in-hospital mortality rate was found between the insurance groups. Readmission rates were higher in managed care patients than for commercial insurance or Medicare patients, but after adjusting for confounding variables

no significant differences were found. The authors conclude that no association between managed care and poor short-term outcomes of hospitalization in CHF patients exist but state that further attention needs to be paid to the increased use of emergency departments by managed care patients (Hanyu et al, 1998).

Philbin & DiSalvo (1998) examined the influence of payer status on the process of care and resource utilization among patients hospitalized for CHF in Managed Care for Congestive Heart Failure: Influence of Payer Status on Process of Care, Resource Utilization, and Short-term Outcomes. In a retrospective study utilizing secondary data obtained from the Statewide Planning and Research Cooperative System database, they reviewed information on patients discharged in 1995 from New York State hospitals. Patients were separated by insurance plans that included HMO, indemnity, Medicaid fee-for-service, and Medicare fee-for-service. Information collected included demographics, comorbid illness, process of care, length of stay, hospital charges, mortality rate, and CHF readmission rate. They found that noninvasive procedures were used with similar frequency and invasive procedures were used greater in HMO and indemnity insurance patients. After adjusting for patient characteristics and hospital type and location, HMO patients had shorter length of stay and lower hospital charges, in part due to decreased length of stay (Philbin & DiSalvo, 1998). The authors conclude that managed care plans provide similar access to clinical services with fewer charges but further prospective study of short-term outcomes is needed to determine if the difference is due to patient mix or quality of care.

In conclusion, lower costs are associated with managed care plans, however the studies agree that further research is needed to determine whether or not it is due to fewer

procedures and/or shorter hospital stays, or due to better case management by the managed care organization.

Concluding the content and methodology review, secondary data can be useful to subsequent studies. Administrative data available through previous studies conducted by hospitals, CMS and other administrative sources can be gleaned for additional valuable information. Unfortunately, the instrument to be used in the research at hand has no prior studies reported, although the information will be made available to researchers in the future.

## **SUMMARY**

In conclusion, the literature review revealed a deficiency of studies devoted to measuring health outcomes based on insurance type. Given that managed care has continued to grow and is unlikely to decline in fiscal appeal, objective measurement of health outcomes for MCO enrollees, HMO in particular, is crucial for the development of safe, effective health plans that provide adequate health care. Without accountability to documented objective outcome data, managed care organizations may provide their enrollees with decreased quality of care in their pursuit of financial gain. As the literature review reveals, further studies comparing outcome data between managed care plans and fee-for-service plans are critical to the future of accountable health care service financing.

## **CHAPTER THREE**

### **METHODS AND PROCEDURES**

#### **INTRODUCTION**

The purpose of this chapter was to define the study population, the instrument to be used for data collection, and the procedures for treating the data. The population included patients treated for and diagnosed with congestive heart failure at an East Tennessee hospital. The method for data collection included retrieval of secondary data from a CHF monitor developed by the hospital to investigate variables specific to CHF health outcomes. The sections below describe the population, instrument, and research design in further detail.

#### **STUDY POPULATION**

The purpose of this section was to describe in detail the population to be studied as well as the geographical area from which the sample was selected. The sample included patients discharged from the University of Tennessee Medical Center in Knoxville, Tennessee (UTMCK) with a diagnosis of congestive heart failure who were enrolled in either a fee-for-service or health maintenance organization health insurance plan. The attending physician and/or cardiologist determined the diagnosis of congestive heart failure. Eligible patients included those in which UTMCK's CHF monitor had been administered and was limited to enrollees of FFS or HMO insurance plans. The following section describes pertinent statistical data regarding the population studied.

### *Population Statistics*

The total population for East Tennessee in 1998 was 633,183, compared to 366,846 in Knox County and 5,430,621 statewide<sup>\*.</sup> The 1998 population by gender included 329,205 females and 303,978 males in East Tennessee, 192,922 females and 173,924 males in Knox County, and 2,830,813 females and 2,599,808 males statewide. Of significance to the need for this study, the leading cause of death in 1997 for the state of Tennessee was cardiovascular diseases. The 1997 death rate per 100,000 for diseases of the heart in Knox County Tennessee was 265.8, compared to 312.1 in East Tennessee and 308.1 statewide (no Tennessee data specific to congestive heart failure was available). The 1997 diseases of the heart death rates per 100,000 by gender included 298.1 females and 327.3 males in East Tennessee, 259.2 females and 273.2 males in Knox County, and 297.6 females and 319.5 males statewide. The study population included a convenience sample of both males and females consisting of all patients admitted to UTMCK with a primary diagnosis of CHF and discharged with the same primary diagnosis during the study period. Given the significant prevalence of the disease in both genders (although higher in males), the study included both genders but did not separate by race or ethnicity.

The East Tennessee environment is rich in vegetation and forestry, but unfortunately the culture of the area patronizes a lifestyle consistent with increased cardiovascular disease risk. Risk factors such as high fat foods including meats and vegetables fried in oil,

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<sup>\*</sup> Nonmetropolitan East Tennessee region includes Anderson, Blount, Campbell, Claiborne, Cocke, Grainger, Hamblen, Jefferson, Loudon, Monroe, Morgan, Roane, Scott, Sevier, and Union counties.

<sup>\*</sup> All statistics obtained from the Tennessee Department of Health and Health Information Tennessee web site

smoking, and obesity are all prevalent in East Tennessee. More studies addressing the outcomes of diseases brought about by poor lifestyle practices are needed. The quantification of congestive heart failure health outcomes by insurance plan can contribute to increased community awareness, as well as providing accountability to insurance companies for treatments provided or withheld.

## **INSTRUMENTATION**

The purpose of this section was to describe in detail the instrument and methods used to obtain the data. The following sections detail the instrument selected and the method of administration, including the follow-up procedure for insufficient sample size and data tabulation.

### *Selection of the Instrument*

For the purpose of this study, secondary data were collected from UTMCK's CHF monitor (see Appendix A). After collaborating with CMS to collect CHF outcome data for a national study, UTMCK developed their own CHF instrument utilizing a panel of physicians that included cardiologists to modify and expand the original CMS instrument in order to collect more comprehensive CHF data not available on the CMS instrument. Validity and reliability of the instrument remains an assumption given that it was not tested for validity and reliability after modification.

The health outcome measurements for this study obtained from UTMCK's CHF monitor included the following:

1. Length of stay (days)
2. Mortality

3. Gender (male/female)
4. Payor (FFS/HMO)
5. Readmitted within 30 days of discharge with related condition
6. Attending physician (cardiology, medicine, family practice, other)
7. Treated with ACE inhibitor
8. Follow-up with a health care provider within 2 weeks scheduled at discharge
9. Documentation of instruction (discharge instructions)
  - A. Diet
  - B. Weight
  - C. Medications
  - D. Activity level
  - E. CHF teaching booklet

In addition to the above health outcome measurements, the type of insurance was recorded with selection limited to patients enrolled in either a fee-for-service or health maintenance organization insurance plan.

### **METHOD OF ADMINISTRATION**

Utilizing registered nurses in the Department of Medical Management, UTMCK originally collected outcome data via chart reviews. Secondary data analysis of the CHF monitor for this study was performed by registered nurses with sample selection based on a diagnosis of CHF and enrollment in a FFS or HMO insurance plan. The health outcome information collected was described in the previous section.

### **FOLLOW-UP PROCEDURE FOR INSUFFICIENT SAMPLE SIZE**

In the event a sample size less than 150 is obtained from the available secondary data sample, the sample size can be increased by performing further chart reviews to provide more primary data. The addition of primary data from the same instrument is feasible given that access to the University of Tennessee Medical Center's CHF patient population has already been approved. Approval from the hospital Institutional Review Board would be obtained prior to accessing the medical record for more primary data.

### **DATA TABULATION**

Once the CHF outcome measurements were collected through secondary data analysis of the CHF monitor, they were compared by insurance plan. All of the afore described indicators will be compared by insurance plan. The section below defines how the data was analyzed.

### **PROCEDURES FOR TREATING THE DATA**

The purpose of this section was to describe the procedures for treating the data. Once the data was obtained, the following statistical methods were applied to the data.

An exposed odds ratio was utilized to determine an estimate of relative risk, or the relationship between two characteristics (insurance plan and outcome). The test determines the odds in favor of being exposed for diseased subjects divided by the odds in favor of being exposed for non-diseased subjects. The test can also be used to measure association between exposure and disease. For this study, multiple 2 x 2 contingency tables were developed where insurance type equaled exposure (e.g. FFS insurance, yes or

no) and outcome equaled each selected variable from the CHF instrument (e.g. treated with ACE inhibitor, yes or no). Utilizing SPSS for statistical analysis, tables were created from collected data that calculated odds ratios (risk estimates) between selected variables. Table 3.1 provides an example of one contingency table that presented the outcome as "treated with ACE inhibitor" and the exposure as "fee for service insurance."

The two possible exposures were 1) enrollment in a FFS insurance plan and 2) enrollment in an HMO insurance plan. The following odds ratio outcomes were collected for FFS insurance type and then again for HMO insurance type:

1. Mortality
2. Readmitted within 30 days of discharge with related condition
3. Treated with ACE inhibitor
4. Follow-up with a health care provider within 2 weeks scheduled at discharge
5. Documentation of teaching (discharge instructions)
  - A. Diet
  - B. Weight
  - C. Medications
  - D. Activity level
  - E. CHF teaching booklet

For each of the above outcomes, a 2 x 2 contingency table was created for members of FFS insurance plans and again for members of HMO insurance plans. SPSS software provided statistical analysis and calculated the risk estimates at a 95% confidence interval for each of the above exposure and outcome combinations.

**Table 3.1: Odds Ratio Example**

		<b>Outcome</b>			
<b>Exposure</b>	<b>Fee-for-Service Insurance</b>	<b>Treated with ACE Inhibitor</b>			<b>Total</b>
		<b>Yes</b>	<b>No</b>		
	<b>Yes</b>	x	x		
	<b>No</b>	x	x		
		<b>Total</b>	x	x	x

In addition to these outcome measures, an independent sample t-test was used to test the null hypothesis that average length of stay of HMO members is equal to the average length of stay of FFS members. To determine whether or not the class of attending physician is dependent upon the type of insurance, a Pearson's chi-square test of independence was used. Table 3.2 summarizes each outcome measure collected and the statistical test used to analyze the data.

### **SUMMARY**

In conclusion, instrument selection was followed by the development of a methodology most appropriate for the type of data to be collected in this case-control study. Composed of multiple risk estimates, the exposed odds ratio is an appropriate test to determine whether a significant difference in the selected variables exists. In addition to the exposed odds ratio, tests such as the independent sample t-test and Pearson's chi-square test of independence can efficiently analyze data when testing the null hypothesis.

**Table 3.2: Data Analysis Summary**

<b>Outcome Measure</b>	<b>Statistical Test</b>
Average length of stay (days)	Independent sample t-test to test the null hypothesis that average length of stay of FFS members is equal to the average length of stay of HMO members.
Mortality (yes or no)	Exposed odds ratio
Gender (male or female)	Categorical definition
Payor (FFS or HMO)	Categorical definition
Readmitted w/in 30 days of discharge with related condition (yes or no)	Exposed odds ratio
Attending physician (cardiology, medicine, family practice, or other)	Pearson's chi-square test of independence
Treated with ACE inhibitor (yes or no)	Exposed odds ratio
Follow-up with health care provider scheduled at discharge (yes or no)	Exposed odds ratio
Documentation of discharge teaching (yes or no)	Exposed odds ratio

The following chapter provides the detailed results of data collection utilizing the above methodology.

## **CHAPTER IV**

### **ANALYSIS AND INTERPRETATION OF DATA**

#### **INTRODUCTION**

The purpose of this chapter was to present analysis of the data. The chapter was divided into the following sections: 1) subject data, 2) results of the study, 3) analysis of the research questions 4) interpretation of the data and 5) summary.

#### **SUBJECT DATA**

The sample included 154 subjects discharged from the University of Tennessee Medical Center, Knoxville (UTMCK) with a primary diagnosis of CHF between the years 1996 to 2000. A stratified random sample of subjects was selected based on a list of all attending physicians at UTMCK caring for patients discharged with a primary diagnosis of CHF during the years specified above. According to type of insurance, only those patients with FFS or HMO insurance plans were selected. The age range was 19 to 98, consisting of 82 females and 72 males. The data revealed a disparity in age groups between insurance plans, with FFS plans comprising a larger percentage of subjects ages 67 and up. Table 4.1 summarizes the distribution by age and insurance plan with comprehensive data on age distribution by insurance plan presented in Appendix B.

#### **RESULTS OF THE STUDY**

The following section describes in detail the results of the statistical tests defined in the Data Analysis Summary displayed in Table 3.2. An alpha of .05 was selected for

level of significance criterion.

To test the null hypothesis that average length of stay (LOS) of FFS members is equal to the average LOS of HMO members an independent sample t-test was performed. The mean LOS was 5.32 and 4.95 days for FFS and HMO members respectively. After confirming homogeneity of variances, the t-test revealed no significant difference in LOS between the insurance plans. Calculation of design power revealed a power of 7% with a difference of 2.5 days needed to obtain a power of 80%. Table 4.2 reveals less than half of a day difference in length of stay between the insurance plans. Table 4.3 displays the results of the t-test.

To determine relative risk of mortality by insurance plan, an exposed odds ratio test was performed. Out of the 154 subjects, all 6 cases of mortality were found in FFS insurance plans, ages 67 and up. Although all 6 cases of mortality were found in FFS insurance plans, the statistical test revealed no increased risk of mortality by insurance plan. The results of the odds ratio are displayed in Table 4.4 with the distribution of mortality cases by insurance plan presented in Table 4.5.

**Table 4.1: Age Distribution by Insurance Plan**

			Payor		Total
			FFS	HMO	
Age Category	66 or less	Count	22	36	58
		% within Age Category	37.9%	62.1%	100.0%
	67+	Count	93	3	96
		% within Age Category	96.9%	3.1%	100.0%
Total		Count	115	39	154
		% within Age Category	74.7%	25.3%	100.0%

**Table 4.2: Mean Length of Stay by Insurance Plan**

	Payor	N	Mean	Std. Deviation	Std. Error Mean
LOS	FFS	115	5.32	4.173	.389
	HMO	39	4.95	6.304	1.009

**Table 4.3: Independent Samples T-Test**

		LOS	
		Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variance	F	1.341	
	Sig.	.249	
T-Test for Equality of Means	t	.420	.345
	df	152	49.768
	Sig. (2-tailed)	.675	.732
	Mean difference	.37	.37
	Std. Error Difference	.889	1.082
95% Confidence Interval of the Difference	Lower	-1.382	-1.800
	Upper	2.129	2.546

**Table 4.4: Risk Estimate of Mortality by Insurance Plan**

	Value	95% Confidence Interval	
		Upper	Lower
For cohort Mortality = No	.948	.908	.989
N of Valid Cases	154		

**Table 4.5: Mortality Distribution by Age and Insurance Plan**

Age Category				Payor		Total	
				FFS	HMO		
66 or less	Mortality	No	Count	22	36	58	
			% within Mortality	37.9%	62.1%	100.0%	
	Total		Count	22	36	58	
			% within Mortality	37.9%	62.1%	100.0%	
	67+	Mortality	Yes	Count	6		6
				% within Mortality	100.0%		100.0%
		No	Count	87	3	90	
			% within Mortality	96.7%	3.3%	100.0%	
Total			Count	93	3	96	
			% within Mortality	96.9%	3.1%	100.0%	

To control for age, Table 4.6 further defines relative risk of mortality by displaying results by age groups 66 or less and 67+.

To determine risk of hospital readmission within 30 days of discharge with a related diagnosis by insurance plan, an exposed odds ratio test was performed. The data revealed 22.6% of FFS cases and 25.6% of HMO cases were readmitted to the hospital within 30 days of discharge with a related diagnosis. The distribution of readmission cases by insurance plan is displayed in Table 4.7. A risk estimate determined no increased risk of readmission between insurance plans as displayed in Table 4.8.

A Pearson's chi-square test of independence was performed to determine if the type of attending physician was dependent upon insurance plan. The data revealed 43.5% of

**Table 4.6: Risk Estimate of Mortality by Age and Insurance Plan**

Age Category		Value	95% Confidence Interval	
			Lower	Upper
66 or less	Odds Ratio for Mortality (No / .)	a		
67+	For cohort Payor = FFS	1.034	.996	1.075
N of Valid Cases		96		

a. No statistics are computed because Mortality is a constant.

**Table 4.7: Distribution of Readmission Cases by Insurance Plan**

		Readmitted within 30 days with CHF related diagnosis?		Total
		Yes	No	
Payor	FFS	26	89	115
	HMO	10	29	39
Total		36	118	154

**Table 4.8: Risk Estimate of Readmission Cases by Insurance Plan**

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for Payor (FFS/HMO)	.847	.365	1.965
For cohort readmitted within 30 days with CHF related diagnosis? = Yes	.882	.468	1.660
For cohort readmitted within 30 days with CHF related diagnosis? = No	1.041	.844	1.283
N of Valid Cases	154		

FFS cases and 46.2% of HMO cases received primary attending services from a cardiologist. The distribution of subjects by attending physician (cardiology, family practice, medicine, or other) and insurance plan is displayed in Table 4.9. Results of the Pearson's chi-square test of independence revealed no significant association between attending physician and insurance plan. Table 4.10 further defines the results.

To determine risk of being treated with an ACE inhibitor by insurance plan, an exposed odds ratio was performed. The data revealed 64.3% of FFS cases and 71.8% of HMO cases were prescribed an ACE inhibitor. The distribution of subjects prescribed an ACE inhibitor by insurance plan is displayed in Table 4.11. Results of the odds ratio revealed no increased risk of being prescribed an ACE inhibitor between the insurance plans. Table 4.12 below displays the results of the test.

To determine if follow-up with health care provider scheduled at discharge was affected by insurance plan, an exposed odds ratio test was performed. The data revealed 87% of FFS cases and 92.3% of HMO cases were scheduled for follow-up within 2 weeks following discharge from the hospital. The distribution is displayed in Table 4.13.

**Table 4.9: Distribution of Subjects by Attending Physician and Insurance Plan**

		Attending Physician				Total
		Cardiology	Family Practice	Medicine	Other	
Payor	FFS	50	16	43	6	115
	HMO	18	5	13	3	39
Total		68	21	56	9	154

**Table 4.10: Pearson's Chi-Square Test of Independence to Determine Association Between Attending Physician and Insurance Plan**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.510*	3	.917
Likelihood Ratio	.494	3	.920
Linear-by-Linear Association	.009	1	.925
N of Valid Cases	154		

\*. 1 cell (12.5%) has an expected count less than 5. The minimum expected count is 2.28.

**Table 4.11: Risk of ACE Inhibitor Prescribed by Insurance Plan**

		ACE Inhibitor Prescribed		
		Yes	No	Total
Payor	FFS	74	41	115
	HMO	28	11	39
Total		102	52	154

**Table 4.12: Risk Estimate of ACE Inhibitor Prescribed by Insurance Plan**

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for Payor (FFS/HMO)	.709	.320	1.570
For cohort ACE Inhibitor Prescribed? = Yes	.896	.706	1.138
For cohort ACE Inhibitor Prescribed? = No	1.264	.724	2.208
N of Valid Cases	154		

Results of the odds ratio test revealed no increased risk of follow-up being scheduled within 2 weeks at time of discharge between the insurance plans. Table 4.14 displays the results of the risk estimate.

To determine differences in risk of documentation of discharge teaching by insurance plan, an exposed odds ratio test was performed. Out of an N of 120, the data revealed 44% of FFS cases and 51.7% of HMO cases had complete documentation of discharge teaching. Table 4.15 displays the distribution of cases. Results of the odds ratio test revealed no increased risk of documentation of discharge teaching by insurance plan. Table 4.16 displays the results of the test.

**Table 4.13: Follow-up Scheduled within Two Weeks by Insurance Plan**

		Follow-up scheduled within 2 weeks following discharge?		
		Yes	No	Total
Payor	FFS	100	15	115
	HMO	36	3	39
Total		136	18	154

**Table 4.14: Risk Estimate of Follow-up Scheduled at Discharge by Insurance Plan**

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for Payor (FFS/HMO)	.556	.152	2.032
For cohort follow-up scheduled within two weeks following discharge? = Yes	.942	.840	1.057
For cohort follow-up scheduled within two weeks following discharge? = No	1.696	.518	5.547
N of Valid Cases	154		

**Table 4.15: Documentation of Discharge Teaching by Insurance Plan**

		Documentation of discharge teaching?		
		Yes	No	Total
Payor	FFS	40	51	91
	HMO	15	14	29
Total		55	65	120

**Table 4.16: Risk Estimate of Discharge Teaching by Insurance Plan**

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for Payor (FFS/HMO)	.732	.317	1.692
For cohort documentation of discharge teaching? = Yes	.850	.558	1.295
For cohort documentation of discharge teaching? = No	1.161	.764	1.764
N of Valid Cases	120		

## ANALYSIS OF THE RESEARCH QUESTIONS

The research questions proposed in Chapter 1 are addressed in the following section.

Research Question #1: How do comparable health outcomes differ for post-hospitalized congestive heart failure patients enrolled in FFS or HMO insurance plans?

Analysis: The health outcomes assessed to address research question 1 included attending physician, follow-up with health care

provider scheduled at discharge, and documentation of discharge teaching. According to the results of this study, there are no statistically significant differences in health outcomes between FFS and HMO insurance plans.

Research Question #2: How do health outcome measurements for post-hospitalized congestive heart failure patients enrolled in and FFS insurance plans affect comparable morbidity rates?

Analysis: The health outcomes assessed to address research question 2 included length of stay, readmission within 30 days of discharge with a related diagnosis, and treated with an ACE inhibitor. According to the results of this study, no statistically significant association between morbidity rates and insurance plan was found. Although shorter LOS and higher readmission rates for HMO members were revealed, no statistically significant differences were discovered.

Research Question #3: How do health outcome measurements for post-hospitalized congestive heart failure patients enrolled in FFS and HMO insurance plans affect comparable mortality rates?

Analysis: The health outcome assessed to address research question 3 included mortality rates for each insurance plan. Results revealed all six cases of mortality in FFS insurance plans;

however an exposed odds ratio test did not indicate a statistically significant difference in mortality rates due to sample size and distribution. All six cases of mortality were found in patients ages 67 and up. It was also discovered that an association between being age 67+ and enrolled in a FFS insurance plan was present.

### **INTERPRETATION OF THE DATA**

The data presented in this study revealed no statistically significant difference in congestive heart failure health outcomes between FFS and HMO insurance plans. Given that managed care reimbursement guidelines are more stringent than FFS plans, the implications of the findings of this study indicate that managed care plans (specifically HMO plans) do not compromise quality of care in the administration and reimbursement of health care services for congestive heart failure patients. The sections below discuss the implications of the findings of this study as they relate to health care providers, patients, and the health care industry as a whole.

#### *Implications of Findings for Health Care Providers*

Based on the findings of this study, the quality of care for congestive heart failure patients does not vary between FFS and HMO insurance plans. Given the above findings, the method of reimbursement (specifically FFS or HMO insurance plans) does not affect the quality of care administered by health care providers. No statistically significant differences were found by attending physician, therefore physician specialty (cardiology, family practice, medicine, or other) does not affect the quality of care

provided for congestive heart failure patients enrolled in FFS or HMO insurance plans.

Based on the above, physicians caring for congestive heart failure patients should not find significant differences in the health outcomes for those patients enrolled in FFS and HMO insurance plans.

#### *Implications of Findings for Patients*

With approximately 4.7 million cases and an overall 5-year mortality rate of 50% for congestive heart failure patients (Whellan et al, 1999), the seriousness of this illness is undisputed. Based on the findings of this study, patients with congestive heart failure enrolled in FFS and HMO insurance plans should not be affected by payor source in the quality of care they receive from their insurance plan and more specifically, their health care providers.

The study revealed a higher percentage of patients ages 67+ enrolled in FFS insurance plans compared to patients enrolled in HMO insurance plans. The findings are likely related to the high number of Medicare patients that comprised the FFS group and the fact that CHF is more prevalent in the elderly population. In addition, Medicare HMOs are not as prevalent in the East Tennessee area as compared to other areas of the United States, thereby contributing to decreased numbers of elderly HMO members available for this study.

#### *Implications of Findings for the Health Care Industry*

Given the undisputed fact that heart disease is the number one cause of death in Americans today with congestive heart failure comprising one of the most costly diagnosis groups, the payors, patients, and health care providers should not see a difference in the quality of care provided between congestive heart failure patients

enrolled in FFS or HMO insurance plans. Nationwide, half of the patients discharged with a CHF diagnosis return to the hospital within 90 days, revealing the difficulty in managing the condition (Xuan et al, 2000). The data in this study revealed 22.6% of FFS cases and 25.6% of HMO cases were readmitted to the hospital within 30 days of discharge with a related diagnosis, and no statistically significant difference in readmission rates found between the insurance plans. As indicated in previous studies, better case management of CHF patients could possibly contribute to decreased readmission rates and subsequent costs associated with treatments and hospitalizations. This study revealed HMO patients had a shorter length of stay and 3% higher readmission rate, possibly indicating that the managed care plans in this study did not positively affect readmission rates as compared to FFS patients who received no case management through their insurance plan.

### **SUMMARY**

In summary, no statistically significant difference in health outcome measurements between FFS and HMO insurance plans was revealed, however differences do exist. The following chapter will discuss a summary of the findings, conclusions, and recommendations.

## **CHAPTER V**

### **SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS**

#### **INTRODUCTION**

This chapter is divided into the following 4 sections: summary of the study, findings of the study, conclusions, and recommendations.

#### **SUMMARY**

The problem addressed in this study determined differences in quality of care as evidenced by post-hospitalized congestive heart failure health outcomes between FFS and HMO insurance plans for patients discharged from the University of Tennessee Medical Center, Knoxville. To accomplish this, the following three research questions were developed:

1. How do comparable health outcomes differ for post-hospitalized congestive heart failure patients enrolled in FFS and HMO insurance plans?
2. How do health outcome measurements for post-hospitalized congestive heart failure patients enrolled in FFS and HMO insurance plans affect comparable morbidity rates?
3. How do health outcome measurements for post-hospitalized congestive heart failure patients enrolled in FFS and HMO insurance plans affect comparable mortality rates?

To achieve the purpose of the study, secondary data were collected from an ongoing congestive heart failure monitor being implemented at the University of Tennessee

Medical Center, Knoxville (UTMCK). Original case selection for the UTMCK study was based on a stratified random sample (by attending physician) of all patients discharged from UTMCK with a primary diagnosis of CHF. For this study, data were collected from a total of 154 subjects. The health outcome measurements for this study obtained from UTMCK's CHF monitor included the following:

1. Length of stay (days)
2. Mortality
3. Gender (male/female)
4. Payor (FFS/HMO)
5. Readmitted within 30 days of discharge with related condition
6. Attending physician (cardiology, medicine, family practice, other)
7. Treated with ACE inhibitor
8. Follow-up with a health care provider within 2 weeks scheduled at discharge
9. Documentation of instruction (discharge instructions)
  - A. Diet
  - B. Weight
  - C. Medications
  - D. Activity level
  - E. CHF teaching booklet

In addition to the above health outcome measurements, the type of insurance was recorded with selection limited to patients enrolled in either a fee-for-service or health maintenance organization insurance plan.

Data was analyzed using the following statistical tests. To test the null hypothesis that average length of stay of FFS members is equal to the average length of stay of HMO members, an independent sample t-test was performed. A Pearson's chi-square test of independence was used to determine whether or not the class of attending physician is dependent upon type of insurance. An exposed odds ratio test was performed to compare the following outcome data:

1. Mortality rates
2. Readmission within 30 days with a related diagnosis
3. Treated with ACE inhibitor
4. Follow-up with health care provider scheduled at discharge
5. Documentation of discharge teaching.

Data was entered into a Microsoft Excel spreadsheet and statistically analyzed using SPSS version 11.0.

## **FINDINGS**

The data collected and statistical tests used to answer the three research questions produced the following findings:

1. No statistically significant difference in the length of stay of HMO members compared to FFS members was found. There was a shorter length of stay revealed in HMO members with an average of 4.95 days and 5.32 days for FFS members.
2. Results revealed all six cases of mortality in FFS insurance plans, however an exposed odds ratio test did not indicate a statistically significant difference in

mortality rates due to sample size and distribution. All six cases of mortality were found in patients ages 67 and up. It was also discovered that an association between being age 67+ and enrolled in a FFS insurance plan was present.

3. With a total of 154 cases, 22.6% of FFS members and 25.6% of HMO members were readmitted to the hospital within 30 days of discharge with a related diagnosis. Although HMO members had a 3% higher readmission rate, an exposed odds ratio did not indicate a significant difference between the insurance plans.
4. Payor source did not affect the probability of cases being attended by a specialist during their hospital stay. A Pearson's chi square test of independence revealed no greater likelihood of FFS and HMO members being attended by cardiology, medicine, family practice, or other physician specialty.
5. Payor source did not affect the likelihood of a patient being treated with an ACE inhibitor. An exposed odds ratio did not reveal a significant difference in the number of patients treated with an ACE inhibitor between the insurance plans.
6. No significant difference in the number of cases with scheduled health care provider follow-up within 30 days of discharge was found.
7. No significant difference in cases with documentation of discharge teaching between the insurance plans was found.

## **CONCLUSIONS**

Based on the findings of this study the following conclusion was drawn:

1. Congestive heart failure patients discharged from the University of

Tennessee Medical Center, Knoxville enrolled in FFS or HMO insurance plans do not experience significant differences in quality of care as evidenced by the health outcomes collected for this study.

### **RECOMMENDATIONS**

Based on the data produced by this study, the following recommendations were made:

1. The study should be replicated in other Knoxville, Tennessee hospitals to provide data generalizable to the geographic population.
2. Further study into decreased length of stay and higher readmission rates among HMO insurance plans should be conducted.
3. Investigation into documentation of teaching, follow-up scheduled at discharge, and the effect on readmission rates could provide data supporting the need for adequate teaching and follow up to decrease exacerbations and subsequent higher readmission rates.

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## **APPENDICES**

## APPENDIX A

### CONGESTIVE HEART FAILURE INSTRUMENT

Indicator	#	%	Comments
<p>Average Age (years)</p> <p>Average LOS (days)</p> <p>Median LOS (days)</p> <p>Mortality</p> <p>Gender:</p> <ul style="list-style-type: none"> <li>• Male</li> <li>• Female</li> </ul> <p>Payor:</p> <ul style="list-style-type: none"> <li>• Medicare</li> <li>• TN Care</li> <li>• Blue Cross</li> <li>• Other</li> </ul> <p>Readmitted within 30 days of this discharge with related condition</p> <p>Attending physician:</p> <ul style="list-style-type: none"> <li>• Cardiology</li> <li>• Medicine</li> <li>• Family Practice</li> <li>• Other</li> </ul> <p>Cardiology consulted if not attending</p> <p>Etiology of CHF documented</p> <p>Cases which had procedure to establish ejection fraction</p> <ul style="list-style-type: none"> <li>• MUGA</li> <li>• PET</li> <li>• ECHO</li> <li>• Cath</li> </ul>			

Indicator	#	%	Comments
<p>Ejection fraction:</p> <ul style="list-style-type: none"> <li>• &lt; 20 %</li> <li>• 20 - 30 %</li> <li>• 31 - 40 %</li> <li>• &gt; 40 %</li> </ul> <p>No ejection fraction documented, but severe LV dysfunction noted</p> <p>ACE Inhibitor</p> <ul style="list-style-type: none"> <li>• Cases receiving during hospitalization</li> <li>• Cases which did not receive ACE inhibitor during hospitalization <ul style="list-style-type: none"> <li># with absolute contraindication</li> <li># with relative contraindication</li> <li># with no documented contraindication</li> </ul> </li> <li>• Discharged on ACE if not contraindicated</li> </ul> <p>Beta Blocker</p> <ul style="list-style-type: none"> <li>• Cases receiving during hospitalization</li> <li>• Discharged on beta blocker if not contraindicated</li> </ul> <p>ASA</p> <ul style="list-style-type: none"> <li>• Cases receiving during hospitalization</li> <li>• Discharged on ASA if not contraindicated</li> </ul> <p>Coumadin</p> <ul style="list-style-type: none"> <li>• Cases receiving during hospitalization</li> </ul>			

Indicator	#	%	Comments
<p>ARB</p> <ul style="list-style-type: none"> <li>Cases receiving during hospitalization</li> </ul> <p>Spironolactone</p> <ul style="list-style-type: none"> <li>Cases receiving during hospitalization</li> </ul> <p>Follow-up with a healthcare provider within 2 weeks scheduled at discharge</p> <p>Home Care consulted</p> <p>Documentation of teaching (discharge instructions)</p> <ul style="list-style-type: none"> <li>Diet</li> <li>Weight</li> <li>Meds</li> <li>Activity Level</li> <li>CHF Teaching Booklet</li> </ul>			

## APPENDIX B

### DISTRIBUTION OF CASES BY AGE AND INSURANCE PLAN

Appendix B: Distribution of Cases by Age and Insurance Plan				
Age		Payor		Total
		FFS	HMO	
19	Count % within		1 100.0%	1 100.0%
26	Count % within		1 100.0%	1 100.0%
32	Count % within	1 100.0%		1 100.0%
36	Count % within		1 100.0%	1 100.0%
37	Count % within	1 100.0%		1 100.0%
40	Count % within	1 100.0%		1 100.0%
42	Count % within	1 50.0%	1 50.0%	2 100.0%
46	Count % within		1 100.0%	1 100.0%
48	Count % within		4 100.0%	4 100.0%
49	Count % within		2 100.0%	2 100.0%
50	Count % within	1 25.0%	3 75.0%	4 100.0%
51	Count % within	2 66.7%	1 33.3%	3 100.0%
53	Count % within	2 50.0%	2 50.0%	4 100.0%
54	Count % within	3 75.0%	1 25.0%	4 100.0%

**Appendix B: Distribution of Cases Continued**

Age		Payor		Total
		FFS	HMO	
55	Count % within	1 33.3%	2 66.7%	3 100.0%
56	Count % within		1 100.0%	1 100.0%
57	Count % within		4 100.0%	4 100.0%
58	Count % within	1 20.0%	4 80.0%	5 100.0%
59	Count % within	1 33.3%	2 66.7%	3 100.0%
60	Count % within	100.0%	1 100.0%	1 100.0%
61	Count % within		1 100.0%	1 100.0%
62	Count % within	2 66.7%	1 33.3%	3 100.0%
63	Count % within		1 100.0%	1 100.0%
64	Count % within	2 100.0%		2 100.0%
65	Count % within	3 100.0%		3 100.0%
66	Count % within		1 100.0%	1 100.0%
67	Count % within	1 100.0%		1 100.0%
68	Count % within	6 100.0%		6 100.0%
69	Count % within	3 100.0%		3 100.0%
70	Count % within	2 100%		2 100%

**Appendix B: Distribution of Cases Continued**

Age		Payor		Total
		FFS	HMO	
71	Count % within	3 100.0%		3 100.0%
72	Count % within	6 100.0%		6 100.0%
73	Count % within	4 100.0%		4 100.0%
74	Count % within	7 77.8%	2 22.2%	9 100.0%
75	Count % within	6 100.0%		6 100.0%
76	Count % within	1 100.0%		1 100.0%
77	Count % within	6 100.0%		6 100.0%
78	Count % within	2 100.0%		2 100.0%
79	Count % within	2 100.0%		2 100.0%
80	Count % within	6 85.7%	1 14.3%	7 100.0%
81	Count % within	5 100.0%		5 100.0%
82	Count % within	6 100.0%		6 100.0%
83	Count % within	2 100.0%		2 100.0%
84	Count % within	5 100.0%		5 100.0%
85	Count % within	5 100.0%		5 100.0%

**Appendix B: Distribution of Cases Continued**

Age		Payor		Total
		FFS	HMO	
86	Count % within	1 100.0%		1 100.0%
87	Count % within	2 100.0%		2 100.0%
89	Count % within	2 100.0%		2 100.0%
90	Count % within	3 100.0%		3 100.0%
92	Count % within	2 100.0%		2 100.0%
93	Count % within	1 100.0%		1 100.0%
94	Count % within	1 100.0%		1 100.0%
95	Count % within	1 100.0%		1 100.0%
97	Count % within	1 100.0%		1 100.0%
98	Count % within	1 100.0%		1 100.0%
Total	Count % within	115 74.7%	39 25.3%	154 100.0%

## VITA

Pamela Driggers Silcox is originally from Vero Beach, Florida where she graduated with a high school diploma from Tabernacle Baptist Christian School in 1987. In 1994 she completed a Bachelor of Science in Nursing degree from East Tennessee State University where she was inducted into Sigma Theta Tau International Nurses Honor Society. In 1999 she completed a Master of Public Health, Gerontology degree from the University of Tennessee, Knoxville. While completing her Ph.D. in Human Ecology she worked as a Graduate Teaching Associate in the department of Health & Safety Sciences and received the *Outstanding Teaching as a Graduate Student* award in April of 2002. Her nursing experience includes extensive experience working with geriatric patients and especially congestive heart failure patients as a registered nurse at Baptist Hospital of East Tennessee and as a case manager for hospice and home health patients in the East Tennessee area. Currently she is employed as part-time faculty at the University of Tennessee, Knoxville in the division of Distance Education and Independent Study coordinating Health 406K, Death, Dying, & Bereavement. In addition, she works as a registered nurse consultant in the Medical Call Center at the University of Tennessee Medical Center. She is a current member of the American Public Health Association.